IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MARK E. EIDSON et al.	§	Group Art Unit:	2654
Serial No.:	09/185,248	§	Examiner:	A. Armstrong
Filed:	November 3, 1998	§		
For:	MIXING DIVERSELY ENCODED DATA STREAMS	§	Atty. Dkt. No.:	ITL.0136US (P6520)

Board of Patent Appeals & Interferences
Commissioner for Patents
Washington, DC 20231

APPEAL BRIEF

Dear Sir:

Applicant hereby appeals from the Final Rejection dated March 12, 2002.

I. REAL PARTY IN INTEREST

The real party in interest is Intel Corporation by virtue of the Assignment recorded at Reel/Frame No. 9552/0065.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF THE CLAIMS

Claims 1-4, 10-12, 16, 19-21, and 23 are finally rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

There are no un-entered amendments.

Date of Deposit: April 26, 2002
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated above and is addressed to the Board of Patent Appeals & Interferences, Commissioner for Patents, Washington, DC 20231.

Dawn L. Thomas

V. SUMMARY OF THE INVENTION

Techniques (including methods and devices) to combine diversely encoded data streams are described. The following embodiment, described in terms of audio data streams, is illustrative only and is not to be considered limiting in any respect.

Referring to FIG. 2, one embodiment of a method in accordance with the invention includes receiving two or more audio data streams, of which at least one is format in accordance with a perceptually based encoding scheme (block **200**). For example, a first data stream may be raw single channel (monophonic) LPCM data, and the second data stream may be an AC-3 encoded 5.1 audio data stream. Those data streams, which are encoded, are decoded into a raw format such as LPCM (block **202**). The raw data streams may then be combined in any desired manner (block **204**). For instance, the first data stream (e.g., single channel LPCM data) may be combined so that it is heard in a specified one (or more) of the second data stream's channels (e.g., AC-3 encoded 5.1 data). Alternatively, the first data stream may be combined so that it is heard in all channels of the second data stream. Further, the relative volume levels of the first and second data streams may be adjusted during the act of combining. The combined data streams may be encoded using a perceptual encoding scheme (block **206**) and transmitted to a down-stream component for further processing or storage (block **208**). Because current CODEC devices are not capable of mixing multiple data streams where some of the data streams are perceptually encoded and others are not, encoding the combined audio data streams allows use of conventional audio devices such as the AC '97 CODEC. (A CODEC device typically includes a digital interface circuit and an analog circuit.) Thus, a method in accordance with the invention may be used to create new audio streams consisting of combinations of new or existing data

streams, which may be processed as ordinary (i.e., non-combined) perceptually encoded audio data streams.

Referring to FIG. 3, a computer system **300** in accordance with one embodiment of the invention is shown. Computer system **300** may include host processor **302** coupled to primary bus **304** through bridge circuit **306**. Bridge circuit **306** may provide an accelerated graphics port (AGP) **310**. Bridge circuit **306** may also provide an interface to couple system random access memory (RAM) **312** to primary bus **304**. Illustrative host processor(s) **302** include the PENTIUM® processor family of processors and the 80X86 families of processors from Intel Corporation. One illustrative bridge circuit **306** is the 82443LX PCI-to-AGP controller manufactured by Intel Corporation. An illustrative primary bus may conform to the peripheral component interface (PCI) standard.

Bridge circuit **324** may couple system bus **304** to secondary bus **326**, while also providing integrated device electronics (IDE) **328** interface through which multimedia source **308** may be coupled to computer system **300**. Bridge circuit **324** may also provide universal serial bus (USB) interface **330**. Source **308** may be, for example, a DVD, which provides an encoded data stream to computer system **300**. One illustrative bridge circuit **324** is the 82371AB PCI-to-ISA/IDE controller made by Intel Corporation. Illustrative secondary buses **326** may conform to the PCI, industry standard interface (ISA), and extended industry standard interface (EISA) standards. Input-output (I/O) circuit **332**, keyboard controller (KYBD) **334**, and system read only memory (ROM) **336** may also be coupled to secondary bus **326**. Input-output circuit **332** may provide an interface for parallel **338** and serial **340** port devices, floppy disks **342**, and infrared devices **344**.

Audio circuit **314**, including decoder **318**, mixer **320**, and encoder **322**, and CODEC **316** may also be coupled to primary bus **304** and receive encoded data from source **308**. An encoded data stream typically includes an audio data portion and a video data portion. Host processor **302** parses the encoded data stream provided by source **308** to generate an encoded video data stream and an encoded audio data stream. The encoded video data stream may be processed by a video unit (not shown), while the encoded audio stream may be routed to decoder **318** via primary bus **304**. Decoder **318** decodes the encoded audio stream into a raw audio data stream (e.g., an audio data stream in LPCM format) and routes it to mixer **320**. Mixer **320**, in turn, combines the raw audio data stream with one or more other raw audio data streams (provided to mixer **320** via primary bus **304** or decoder **318**) to generate a combined audio data stream. Output from mixer **320** may be encoded by encoder **322**, which may apply any suitable or desirable perceptual encoding scheme. The encoded/combined audio data stream may then be conveyed to CODEC **316** (in digital format) via primary bus **304** where it is processed for eventual presentation to a user.

In the embodiment of FIG. 3, audio circuit **314** is a hardware component operatively coupled to computer system **300** via primary bus **304**. In an alternative embodiment, one or more of decoder **318**, mixer **320**, and encoder **322** may be implemented within the digital controller device in accordance with the AC '97 specification, or bridge circuit **306**. In yet another embodiment, one or more of decoder **318**, mixer **320**, and encoder **322** may be implemented as software modules, stored in RAM **312** or ROM **336** and executed by host processor **302**.

Other embodiments are within the scope of the following claims. For instance, encoded data streams are not limited to audio data streams; they may also comprise video or multimedia

data streams for instance. Further, encoded audio data streams are not limited to those provided by a DVD device -- audio data streams suitable for combining in accordance with the invention may be obtained from, among other sources, compact disks (CDs), microphones, and sound effect software applications. In addition, decoder **318**, mixer **320**, and encoder **322** may be implemented as software modules executed by a programmable control device. A programmable control device may be a computer processor or a custom designed state machine. Custom designed state machines may be embodied in a hardware device such as a printed circuit board comprising discrete logic, integrated circuits, or specially designed application specific integrated circuits (ASICs). Storage devices suitable for tangibly embodying program modules include all forms of non-volatile memory including, but not limited to: semiconductor memory devices such as EPROM, EEPROM, and flash devices; magnetic disks (fixed, floppy, and removable); other magnetic media such as tape; and optical media such as CD-ROM disks.

VI. ISSUES

A. Can References That Do Not Teach Or Suggest Combining Two Linear Pulse Code Modulated Signals Together Using In Part A Liner Pulse Code Modulated Mixer Render Claims 1-19 and 21-23 Obvious?

B. Can References That Do Not Teach Or Suggest Combining Two Linear Pulse Code Modulated Signals Utilizing In Part A Liner Pulse Code Modulated Mixer And Encoding The Combined Data Stream Into A Second Compressed Format Before Receipt By A CODEC Device Render Claim 20 Obvious?

VII. GROUPING OF THE CLAIMS

Group 1: claims 1-19 and 21-23 can be grouped together; and

Group 2: claim 20.

VIII. ARGUMENT

A. Can References That Do Not Teach Or Suggest Combining Two Linear Pulse Code Modulated Signals Together Using In Part A Liner Pulse Code Modulated Mixer Render Claims 1-19 and 21-23 Obvious?

With respect to group 1 claims, claim 1 is representative of the claims in this group and includes limitations "decoding the first audio stream into a linear pulse code modulated format", "obtaining a second audio stream in a linear pulse code modulated format", and "combining the first decoded audio data stream with the second audio data stream, utilizing in part a linear pulse code modulated mixer, for receipt by a CODEC". These limitations are not disclosed or otherwise suggested in the cited references.

Claims 1-19 and 21-23 were rejected under § 103(a) for the reasons of record.

In the Advisory Action mailed 4/11/2002, the Examiner states:

> "Alexander et al teach an audio processing system which implements a mixer that allows for the mixing of PCM signals. Thus, the combination of Farhangi et al, Berger et al. Hinderks, and Alexander et al. would teach receiving an audio stream in a perceptually based format, decoding the audio stream into a linear pulse code modulated format, obtaining a second audio stream in a linear pulse code modulated format, and combining the two audio streams using a LPCM mixer for receipt by a CODEC."

However, the Examiner is mistaken on a number of points. For example, none of the four cited references include a discussion of any linear pulse code modulated signal much less the combining of two such signals by a linear pulse code modulated mixer as required in Applicants claims. At a minimum, the references must show the use of a linear pulse code modulated mixer for mixing two audio data streams that are in linear pulse code modulated format. None of the references disclose or suggest such a mixer.

The Examiner directed Applicants attention to column 8, lines 26-30 for the proposition that the Alexander et al. reference teaches a digital processing system a method which allows for

mixing PCM data. Office Action mailed 3/12/02, p. 4. This section of the Alexander reference discusses data received from the stereo mixing section by digital mixer 307 that resulted from mixing of PCM data received through the SDAT_OUT of the AC97 link 105 with the MIC1 or MIC2, LINE, CD, VIDEO, and AUX INPUTS of the INPUT port 101. However, that is different from disclosing that the PCM data has been mixed with another data stream that is also in PCM format as required by Applicants claims. In addition, the reference makes no reference to linear pulse code modulated signals.

As not all the limitation of Applicants independent claims have been discussed or suggested, for at least this reason, Applicants believe that the rejection of Applicants claims 1-19, and 21-23 should be reversed.

B. Can References That Do Not Teach Or Suggest Combining Two Linear Pulse Code Modulated Signals Utilizing In Part A Liner Pulse Code Modulated Mixer And Encoding The Combined Data Stream Into A Second Compressed Format Before Receipt By A CODEC Device Render Claim 20 Obvious?

With respect to claim 20 of claim group 2, claim 20 includes the limitation "further comprising encoding the combined data stream into a second compressed format before receipt by the CODEC device." This limitation is not disclosed or otherwise suggested in any of the four cited references. This claim was rejected for the reasons of record

The Examiner has not pointed out in any of the references where the limitation of claim 20 is accomplished or discussed. Instead, the Examiner makes the general statement:

> "therefore, it would have been obvious to one of ordinary skill the time of invention to modify this system of Farhangi et al. to encode the combined signals in either a perceptually base format for the purpose of compressing signal to achieve reduced transmission bandwidth or recording area without degrading the audio quality as taught by Bergher et al."

Applicant points out that Bergher et al. deals with decoding of Dolby AC-3 and MPEG data stream into a pulse code modulated data stream. Bergher does not deal with encoding at all.

Furthermore, Applicants believe that the § 103 combination as pieced together by the Examiner is improper. A *prima facie* case of obviousness has not been established in that at least some of the claimed elements are missing from the cited references as discussed with respect to group 1 claims, and there is no motivation or suggestion in the cited references to combine them as the Examiner has pieced them together. For example, the Examiners statement which was cited above with regard to claim 20 is clearly an attempted hindsight reconstruction of Applicant's invention.

The Examiner has shown no reference that discloses combining two LPCM signals. The Examiner has shown no reference that combines LPCM signals using in part PCM mixer. Additionally, the Examiner has shown no reference where a mixed LPCM signal is compressed before it goes into a CODEC as required by claim 20.

In the Office Action mailed 10/23/01, on page 4, the Examiner states:

> "[r]efer to Hinderks who teaches transmitting coded signals through a transmission channel with limited bandwidth using a CODEC...for the purpose of allowing for two-way communication between multiple devices..."].

Thus, the Examiner has acknowledged that a CODEC device maybe useful for transmitting data over a limited bandwidth transmission channel. Therefore, it is unclear why one skilled in the art, without knowing of Applicant's invention, would look to compress data before it is used as an input to a CODEC. The Examiner has stated no such reasoning.

For at least the reasons discussed above, Applicants believe that the rejection of Applicants claim 20 is improper and respectfully request that the rejection be reversed.

IX. TECHNICAL INFORMATION SUBMISSION FOR THE BOARD

For the convenience of the Board, Applicant is submitting an excerpt from a book *CMOS Analog Circuit Design,* authored by Phillip E. Allen and Douglas R. Holberg. This excerpt is submitted to give the board additional insight into how a delta-sigma analog-to-digital converter operates. The Alexander et al. reference refers to delta-sigma analog-to-digital converters. It should be noted, in this excerpt, there is no mention that the Delta-Sigma analog-to-digital converter outputs linear pulse code modulated signals.

X. CONCLUSION

It is respectfully submitted that each of the final rejections be reversed and that the claims subject to this appeal be allowed to issue.

Respectfully submitted,

Date: 4/26/02

Howard R. Boyle, Reg. No. 29,617
Trop, Pruner & Hu, P.C.
(713) 468-8880 [Phone]
(713) 468-8883 [Fax]

APPENDIX OF CLAIMS

The claims on appeal are:

1. A method to combine diversely encoded audio data streams, comprising:

receiving a first audio data stream in a first perceptually based format;

decoding the first audio data stream into a linear pulse code modulated format;

obtaining a second audio data stream in a linear pulse code modulated format; and

combining the decoded first audio data stream with the second audio data stream, utilizing in part a linear pulse code modulated mixer, for receipt by a CODEC.

2. The method of claim 1, further comprising encoding the combined audio data stream into the first perceptually based format before receipt by the CODEC.

3. The method of claim 2, wherein the act of encoding the combined audio data stream into the first perceptually based format comprises encoding the combined audio data stream into an AC-3 format.

4. The method of claim 2, wherein the act of encoding the combined audio data stream into the first perceptually based format comprises encoding the combined audio data stream into a MPEG-2 format.

10. The method of claim 1, wherein the act of combining comprises mixing the first audio data stream and the second audio data stream to generate a single composite audio data stream.

11. The method of claim 1, wherein the act of obtaining a second audio data stream in LPCM format comprises:

receiving a second audio data stream in a second perceptually based format; and decoding the second audio data stream into the LPCM format.

12. A program storage device, readable by a programmable control device, comprising:

instructions stored on the program storage device for causing the programmable control device to

receive a first audio data stream in a first perceptually based format;

decode the first audio data stream into LPCM format;

require a second audio data stream in LPCM format;

combine the decoded first audio data stream with the second audio data stream, utilizing in part a LPCM mixer;

encode the combined audio data stream into a second perceptually based format; and

transmit the encoded combined audio data stream to a CODEC circuit.

16. The program storage device of claim 12, wherein the instruction to acquire a second audio data stream in LPCM format comprise instructions to:

receive a second audio data stream in a third perceptually based format; and

decode the second audio data stream into the LPCM format.

19. A method to combine diversely encoded data streams, comprising:

receiving a first data stream in a first compressed format;

decoding the first data stream into LPCM format;

obtaining a second data stream in LPCM format; and

combining the decoded first data stream with the second data stream, utilizing in part a LPCM mixer, for receipt by a CODEC device.

20. The method of claim 19, further comprising encoding the combined data stream into a second compressed format before receipt by the CODEC device.

21. The method of claim 19, wherein the first data stream comprises an audio data stream.

23. The method of claim 19, wherein the compressed format comprises a MPEG format.